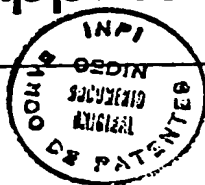


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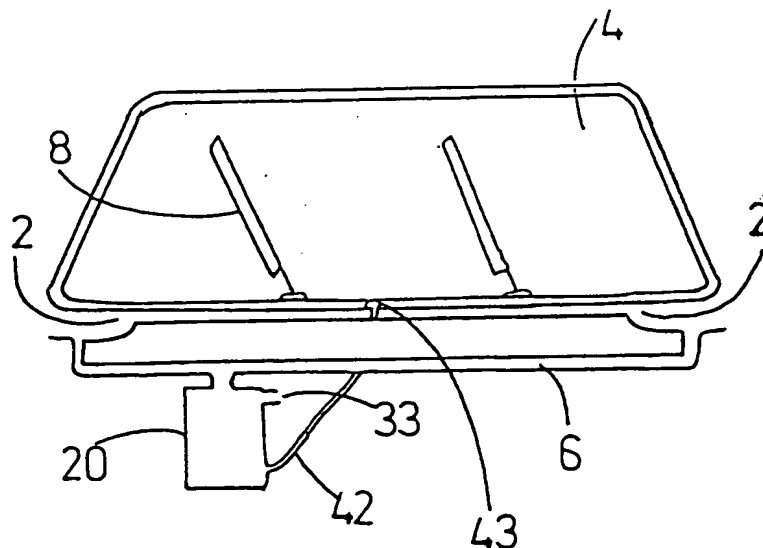
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(54) Rainwater collection arrangement for vehicles

(57) An apparatus for automatically replenishing a water utilisation device, such as a windscreen washer, by collecting rainwater falling on the surface of the vehicle, such as the windscreen (4) in a gutter (2) situated at the base thereof which is connected to a delivery pipe (6) for transporting the water to a storage container, such as a windscreen wash bottle (20).

FIG.1



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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

FIG. 1

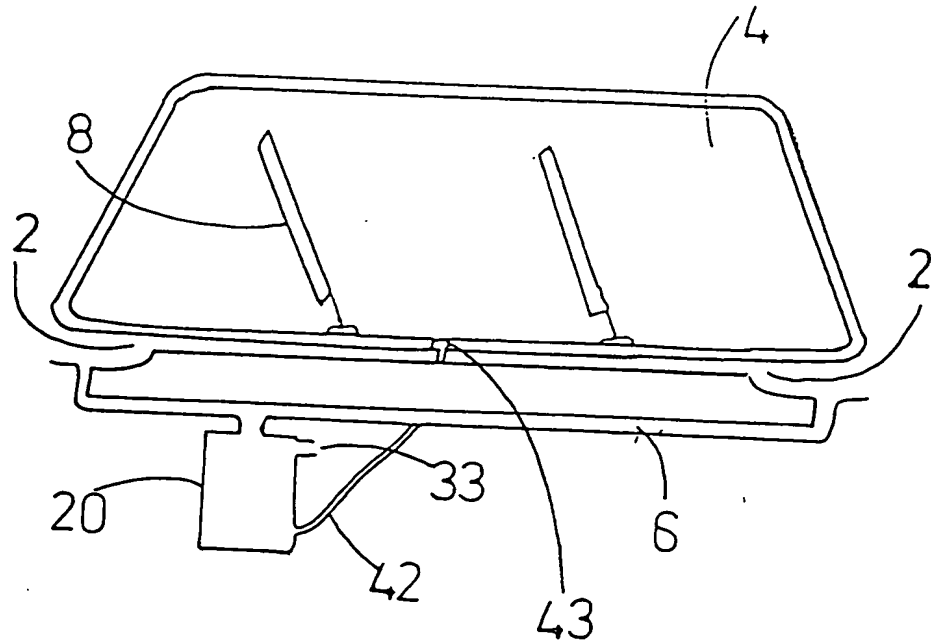


FIG. 2

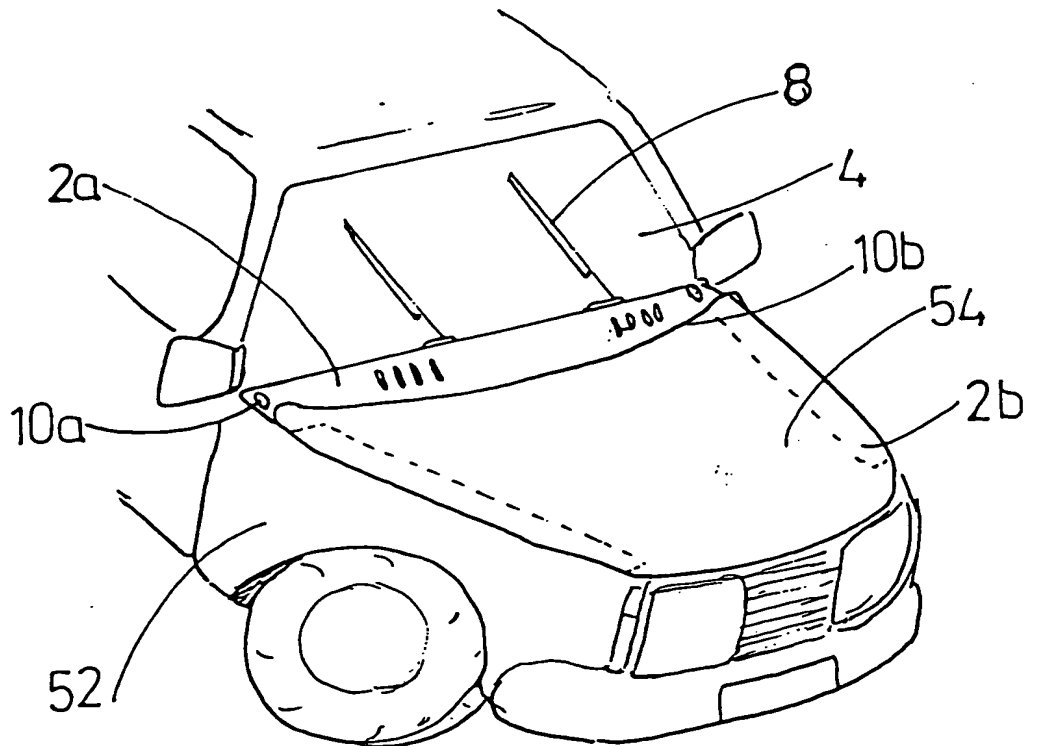
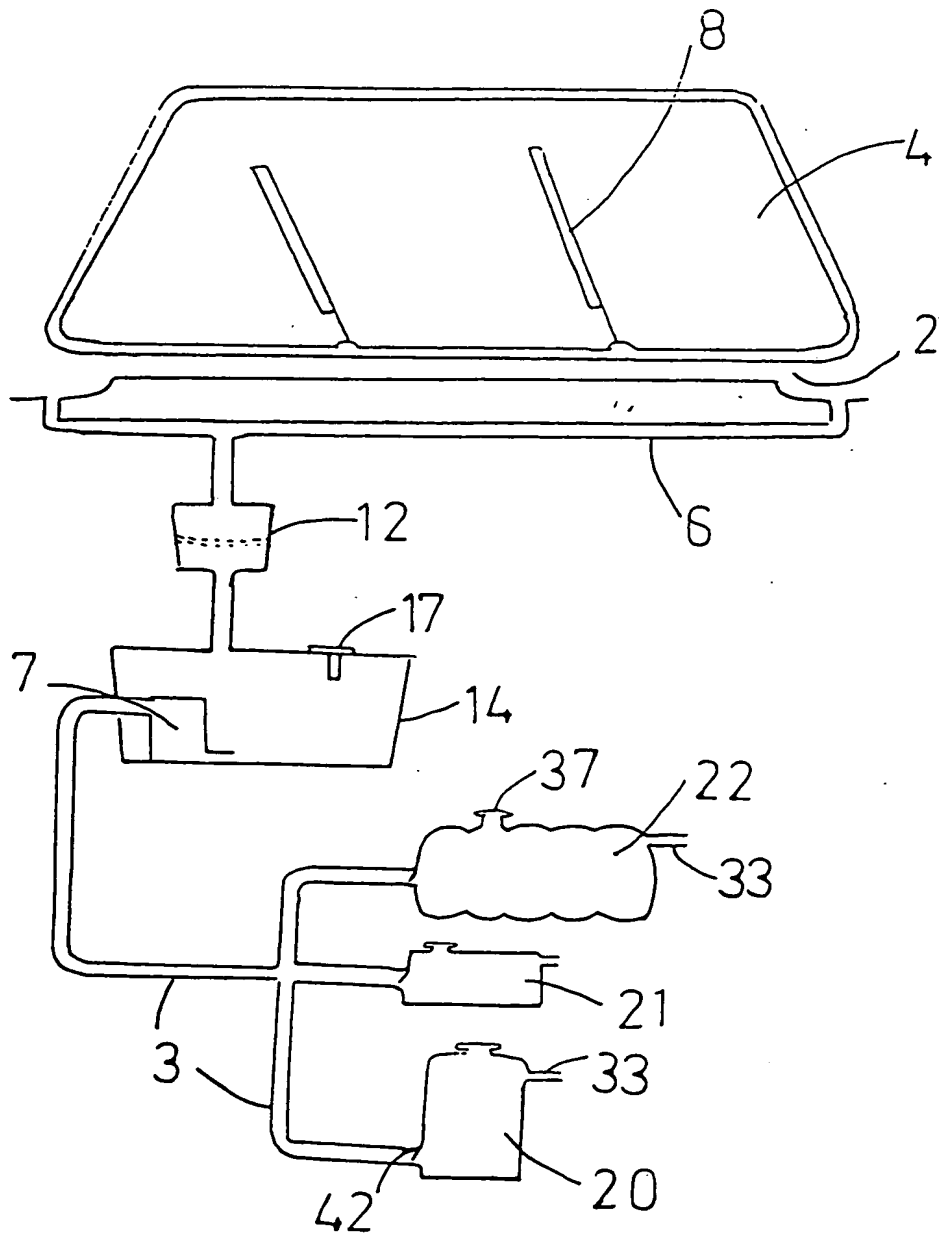


FIG. 3



TITLE: Improvements relating to the water supply system of vehicles

DESCRIPTION

The present invention relates to improvements in the water supply system of vehicles, in particular to a method and apparatus for automatically replenishing the water utilisation devices of vehicles.

Vehicles, especially motor vehicles, are provided with various water utilisation devices such as windscreen washers and headlight washers which require a supply of water. Generally, a water storage reservoir supplies water to these devices. Such reservoirs are limited in size and hence, they have to be replenished periodically as the contents are used up. To reduce the likelihood of the reservoir running dry during a journey, it is known to provide a sensor to let the vehicle operator know that replenishment is necessary. However, it is rarely convenient to do this. Additionally, the radiator of the vehicle contains water which also requires topping up at periodic intervals.

It is an object of the present invention to provide a method and apparatus which may overcome the afore-mentioned drawbacks.

According to the present invention there is provided a method of automatically replenishing a water utilisation device of a vehicle comprising the steps of collecting rainwater from the surface of the vehicle and transporting said rainwater to the water utilisation device.

According to another aspect of this invention there is provided an apparatus

for automatically replenishing a water utilisation device of a vehicle comprising means for collecting rainwater from the surface of the vehicle and means for transporting the collected rainwater to a water utilisation device.

Preferably, the means for collecting rainwater comprises rainwater collection tracks or gutters, particularly, but not exclusively, for collecting water that falls on the windscreen and/or bonnet of a vehicle. For example, gutters may be provided at the base of the windscreen adjacent the bonnet, or incorporated in the vehicle bodywork part of the bulkhead, and having drainage points at a convenient location, for example at either end and/or having slots therethrough. The collected water may be directed straight into the utilisation device or be collected in, for example, a trap device and passed to the transportation means.

Additionally, or alternatively, gutters may be provided to collect water that falls on the bonnet of the vehicle, preferably being positioned around the sides of the engine compartment of the vehicle to collect water which flows through the gap existing between the bonnet and the wings of the vehicle. For example, the sides of the wings of the vehicle may be shaped to form gutters which underlie the edges of the bonnet when the bonnet is in the closed position. Preferably, such gutters are provided along three sides of the engine compartment, especially all four sides. However, it is to be appreciated that the gutters are not limited to the afore-mentioned positions.

The transportation means are preferably in the form of delivery pipes connecting the gutters to the water utilisation device. Alternatively, the transportation means may be in the form of guttering. Preferably, the water utilisation device is

provided with a water storage container for supplying water thereto. In this manner, the collected water may be delivered to the container which may then be used, when required, to supply water to the device.

It is preferable to provide a filter prior to the entry of the water into the water utilisation device or storage container to remove debris, dead insects and the like from the collected rainwater. The filter may be positioned at for example, the entry point or at the exit point of the delivery pipes or alternatively, intermediate the two. Preferably, the filter is detachable to enable the cleaning thereof at periodic intervals.

Preferably, an intermediate storage reservoir collects the rainwater before delivery to one or more storage containers.

In particular, the intermediate storage reservoir may be provided with pump means to pump the collected water through further delivery pipes to the water utilisation devices or their respective storage container(s). Ideally, a level probe activates the pump once a sufficient amount of water has been collected in the intermediate reservoir.

The storage container may be in the form of, for example, a rear and/or front windscreen wash bottle. The storage container may also be in the form of the vehicle radiator with means being provided to enable entry of the water under pressure. Preferably, the storage container is provided with an overflow system to enable water to drain freely away from the container and vehicle once the container is full.

Alternatively, the storage container may be provided with a sensor which causes the pump in the intermediate reservoir to be switched off once a certain water

level is reached in the containers. In this case, an overflow system should preferably be included in the intermediate storage reservoir.

Preferably, a one-way valve is provided at the entry of the storage container to ensure flow of water in one direction only. Further such valves may also be provided elsewhere in the apparatus to ensure water flows from the collection points to the storage containers.

The apparatus of the invention may be made from a variety of materials but preferably is made of a durable, plastics material.

It is to be appreciated that the apparatus may be one of a number of designs depending upon the type of vehicle in which it is to be installed. Whilst the apparatus is particularly suitable for land vehicles, it may be equally appropriate to, for example, water and air vehicles.

For a better understanding of the present invention and to show more clearly how it may be carried into effect, reference will now be made by way of example only, to the accompanying drawings in which:-

Figure 1 is a schematic diagram of one embodiment of an apparatus fitted to a vehicle according to the present invention;

Figure 2 is a perspective view of the front end of a vehicle fitted with an apparatus as shown in Figure 1; and

Figure 3 is an alternative embodiment of an apparatus according to the present invention.

Referring to Figures 1 and 2 of the accompanying drawings, a simple embodiment of an apparatus according to the present invention is illustrated. The

apparatus is shown in relation to the windscreen 4 of the vehicle, with the major proportion of the apparatus preferably being situated under the bonnet 54 of a vehicle. The apparatus comprises a rainwater collection track or gutter 2 connected to a delivery pipe 6 leading to a storage container 20.

The gutter collects at least a proportion of the water falling onto the windscreen 4 of the vehicle, the majority of which may be wiped from the screen by windscreen wipers 8. The gutters are strategically positioned to intercept water displaced from the windscreen by the wipers or otherwise flowing from the windscreen and/or bonnet. For example, the gutters may be positioned at the foot of the windscreen adjacent the bonnet, as shown as 2a in Figure 2. The surface 2a is provided with drainage points 10a at either end and has drainage slots 10b through which the collected water may flow. Gutters 2b are also provided around the sides of the engine compartment of the vehicle to collect water which flows through the gap existing between the vehicle wings 52 and the bonnet 54. For example, the innermost sides of the wings may be cast to provide gutters (ie. shallow troughs) which underlie the edges of the bonnet 54 when the bonnet is in the closed position. The windscreen wipers and gutters are standard features already provided in the majority of motor vehicles, the gutters enabling water collected on the windscreen and bonnet to be directed away from the vehicle.

In the present invention, the rainwater collected in the gutters is directed into delivery pipes 6 which transport the water to the storage container 20. The storage container may be, for example, a windscreen wash bottle for supplying water to the windscreen via a tube 42 and nozzle 43 to assist in the washing thereof. The top of

the container 20 is also provided with an overflow outlet 33 such that excess water can drain freely away from the vehicle. Hence, in this manner, the container is automatically topped up whenever there is rainfall, hence reducing the likelihood of the container running dry and the frequency with which it needs to be manually re-filled. The operation would still occur during any rainy conditions even when the car is parked without the aid of the wipers, albeit the collection may be somewhat less efficient.

It is to be appreciated that the water collected in the gutters may also be transported immediately to the water utilisation device or that the gutters may have storage containers connected thereto.

Figure 3 of the accompanying drawing shows an alternative embodiment of the present invention. Features already discussed in relation to Figure 1 are given the same reference numerals and only the additional features will be discussed in detail. Rainwater flowing through the delivery pipe 6 passes through a filter 12 to remove debris, dead insects and the like which, for example, have been collected on the windscreen and pushed into the gutter 2 by the windscreen wipers 8. The filtered rainwater then flows, under the influence of gravity into an intermediate storage reservoir 14 having a level probe 17.

The rainwater collects in the intermediate reservoir until a critical level is reached, at which point a pump 7 is activated and pumps the rainwater into a further delivery pipe 3. This pipe may transport the water to a single storage container or a number of water storage containers, for example, a front windscreen wash bottle 20, and a rear windscreen wash bottle 21, as shown in Figure 2. Each of the containers

are provided with an overflow system 33 and may be topped up manually by removing the caps 37. Additionally, at the entry of the delivery pipe 3 to each of the containers 20, 21 is a one-way valve 42 which prevents water being forced back up the delivery pipe.

Furthermore, the delivery pipe 3 may transport water to the radiator 22 of the vehicle. In this case, means will have to be provided to maintain the pressurisation within the device.

It is to be appreciated that further containers may be connected to the delivery pipe and that, for example, the filter may be conveniently situated elsewhere within the apparatus. The containers may also be provided with sensors to cause deactivation of the pump when a critical water level is reached, in which case the intermediate reservoir would require an overflow outlet to enable excess water to drain away.

The apparatus of the present invention removes the inconvenience of frequently having to manually refill the water storage containers of a vehicle which are often situated in awkward places. The provision of an automatically replenishable wash bottle is especially useful on long journeys in poor weather conditions when frequent washing of the windscreen is required.

CLAIMS

1. An apparatus for automatically replenishing a water utilisation device of a vehicle comprising means for collecting rainwater from the surface of the vehicle and transporting said rainwater to the water utilisation device.
2. An apparatus as claimed in claim 1, wherein the means for collecting the rainwater comprises rainwater collection tracks or gutters.
3. An apparatus as claimed in claim 2, wherein the gutter or track is arranged to collect water from the windscreen of the vehicle.
4. An apparatus as claimed in claim 3, wherein the gutter or track is provided at the base of the windscreen adjacent the bonnet of the vehicle.
5. An apparatus as claimed in claim 3 or 4, wherein the gutter or track is incorporated into the bodywork part of the bulkhead.
6. An apparatus as claimed in any one of claims 2 to 5, wherein the gutter or track is provided with at least one drainage point at a convenient location.
7. An apparatus as claimed in claim 6, wherein a drainage point is located at one or both ends of the gutter or track.
8. An apparatus as claimed in claim 6 or 7, wherein a drainage point is provided by means of a slot through the gutter or track.
9. An apparatus as claimed in any one of the preceding claims, wherein the collected water is transported directly into the utilisation device.
10. An apparatus as claimed in any one of claims 1 to 8, wherein the water is collected in a trap device before being passed to means for transporting the water to

the utilisation device.

11. An apparatus as claimed in any one of claims 2 to 10, wherein a gutter or track is arranged to collect water which falls on the bonnet of the vehicle.
12. An apparatus as claimed in claim 11, wherein the gutter or track is positioned around the sides of the engine compartment of the vehicle to collect water which flows through the gap existing between the bonnet and wings of the vehicle.
13. An apparatus as claimed in claim 12, wherein the sides of the wings of the vehicle are shaped to form gutters which underlie the edges of the bonnet when it is in the closed position.
14. An apparatus as claimed in claim 12 or 13, wherein the tracks or gutters are provided along at least three sides of the engine compartment.
15. An apparatus as claimed in claim 14, wherein the tracks or gutters are provided around all four sides of the engine compartment.
16. An apparatus as claimed in any one of the preceding claims, wherein the transportation means is in the form of a delivery pipe connecting said means for collecting the rainwater to the water utilisation device.
17. An apparatus as claimed in any one of claims 1 to 15, wherein the transportation means is in the form of guttering.
18. An apparatus as claimed in any one of the preceding claims, wherein the water utilisation device is provided with a water storage container for supplying water thereto.
19. An apparatus as claimed in claim 18, wherein a filter is provided prior to entry of water into the storage container.

20. An apparatus as claimed in any one of claims 1 to 18, wherein a filter is provided prior to entry of the water into the utilisation device.
21. An apparatus as claimed in claim 19 or 20 wherein a filter is positioned at the entry point or the exit point of said transportation means.
22. An apparatus as claimed in claim 19 or 20, wherein a filter is provided intermediate the entry or exit points of said transportation means.
23. An apparatus as claimed in any one of claims 19 to 22, wherein the filter is detachable to allow cleaning thereof.
24. An apparatus as claimed in any one of claims 18 to 23, wherein an intermediate storage reservoir collects rainwater from said collecting means before delivery to one or more storage containers.
25. An apparatus as claimed in claim 24, wherein the intermediate storage reservoir is provided with pump means to pump collected water through further transportation means to the one or more water utilisation devices or a respective storage container therefor.
26. An apparatus as claimed in 25, wherein a level probe is provided to activate the pump once a sufficient amount of water has been collected into the intermediate reservoir.
27. An apparatus as claimed in any one of claims 18 to 26, wherein the storage container is in the form of a front and/or rear windscreen wash bottle.
28. An apparatus as claimed in any one of claims 18 to 27, wherein the storage container is in the form of a vehicle radiator.
29. An apparatus as claimed in claim 28, wherein means is provided to enable

entry of the water into the radiator under pressure.

30. An apparatus as claimed in any one of claims 18 to 29, wherein the storage container is provided with an overflow system.

31. An apparatus as claimed in any one of claims 25 to 29, wherein the storage container is provided with a sensor for deactivating the pump in the intermediate reservoir once a certain water level is reached in the containers.

32. An apparatus as claimed in claim 31, wherein an overflow system is included in the intermediate storage reservoir.

33. An apparatus as claimed in any one of the preceding claims, wherein at least one one-way valve is provided to ensure water flows in the required direction through the apparatus.

34. An apparatus as claimed in claim 33, wherein a one-way valve is provided at the entry of the storage container.

35. An apparatus as claimed in any one of the preceding claims, wherein the apparatus is made of a durable, plastics material.

36. An apparatus as claimed in any one of the preceding claims, wherein the utilisation device is a windscreen washer.

37. An apparatus as claimed in any one of claims 1 to 35, wherein the utilisation device is a washer for a vehicle light.

38. An apparatus substantially as hereinbefore described and with reference to Figures 1 and 2 or 3 of the accompanying drawings.

39. A method of automatically replenishing one or more water utilisation devices comprising the steps of collecting rainwater from the surface of the vehicle and

transporting said rainwater to the water utilisation device.

40. A method as claimed in claim 39 and comprising pumping water from an intermediate storage container to one or more water utilisation devices in response to a water level responsive control signal.

41. A method of automatically replenishing a water utilisation device substantially as hereinbefore described with reference to figures 1 and 2, or 3 of the accompanying drawings.



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Claims searched: 1-41

Examiner: John Fulcher
Date of search: 15 October 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.O): A4F(FAK,FAL,FAMA,FAMD); B7J(J72)
Int Cl (Ed.6): B60R 13/07,15/00,15/02,15/04; B60S 1/46,1/48,1/50
Other: Online : WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2276129 A (RAMSDEN)	1 at least
X	GB 2213444 A (TWEEDLE)	1 at least
X	EP 0352372 A1 (AMBROS)-n.b. English abstract and fig 1	1 at least
X	WO 96/40544 A1 (ITT)	1 at least
X	DE 3243173 A1 (SANDER) - see fig and English abstract	1 at least
X	DE 2700926 (FISCHER) -see English abstract	1 at least
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